THE Next Wave
The National Security Agency's review of emerging technologies

Editor's column

Managing Editor

"End of the road for Roadrunner" Los Alamos National Laboratory, March 29, 2013.[a]

Five years after becoming the fastest supercomputer in the world, Roadrunner was decommissioned by the Los Alamos National Lab on March 31, 2013. It was the first supercomputer to reach the petaflop barrier—one million billion calculations per second. In addition, Roadrunner's unique design combined two different kinds of processors, making it the first "hybrid" supercomputer. And it still held the number 22 spot on the TOP500 list when it was turned off.

Essentially, Roadrunner became too power inefficient for Los Alamos to keep running. As of November 2012, Roadrunner required 2,345 kilowatts to hit 1.042 petaflops or 444 megaflops per watt. In contrast, Oak Ridge National Laboratory's Titan, which was number one on the November 2012 TOP500 list, was 18 times faster yet five times more efficient.

In addition, data-intensive applications for supercomputers are becoming increasingly important. According to the developers of the Graph500 benchmarks, these data-intensive applications are "ill-suited for platforms designed for 3D physics simulations," the very purpose for which Roadrunner was designed. New supercomputer architectures and software systems must be designed to support such applications.

These questions of power efficiency and changing computational models are at the core of moving supercomputers toward exascale computing, which industry experts estimate will occur sometime between 2020 and 2030. They are also the questions that are addressed in this issue of *The Next Wave (TNW)*.

Look for articles on emerging technologies in supercomputing centers and the development of new supercomputer architectures, as well as a brief introduction to quantum computing. While this column takes the reader to the recent past of supercomputing, the remainder of the issue will propel you "beyond digital" to the future of advanced computing systems.

Managing Editor, *The Next Wave*

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a. Press release, Los Alamos National Laboratory. 29 March 2013. Available at: http://www.lanl.gov/newsroom/news-releases/2013/March/03.29-end-of-roadrunner.php.